CONTENTS OF VOLUME 113 · 1998

Oecologia

In Cooperation with the
International Association for Ecology (Intecol)

Editors in Chief

J.R. Ehleringer, Salt Lake City
M. Schaefer, Göttingen
E.-D. Schulze, Bayreuth
D.R. Strong, Bodega Bay

Editorial Board

I. Baldwin, Jena
M.C. Ball, Canberra
F.A. Bazzaz, Cambridge
J. Blondel, Montpellier
W.J. Bond, Rondebosch
D. Bowers, Boulder
R. Brandl, Bad Lauchstädt
J.J. Burdon, Canberra
M.M. Caldwell, Logan
B. Casper, Philadelphia
P.D. Coley, Salt Lake City
M.J. Crawley, Ascot
T. Dawson, Ithaca
P.J. Den Boer, Wijster
P. Doherty, Townsville
P.R. Ehrlich, Stanford
G.D. Farquhar, Canberra
K. Fiedler, Bayreuth
D. Freckman, Fort Collins
H.C.J. Godfray, Ascot
I. Hanski, Helsinki
A. Hastings, Davis
H. Heilmeier, Tharandt
T. Hirose, Sendai
P. Högberg, Umeå
D. Hollinger, Durham
L.E. Hurd, Lexington
S. Jonasson, Copenhagen
P.M. Kareiva, Seattle
A. Knapp, Manhattan
C. Körner, Basel
S.L. Kohler, Champaign
O.L. Lange, Würzburg
J.H. Lawton, Ascot
S. McNaughton, Syracuse
D.B. Miles, Athens
R. Monson, Boulder
K. Nadelhoffer, Woods Hole
K. Nagy, Los Angeles
D. Neumann, Köln
R. Oren, Durham
C. Osenberg, Gainesville
C. Otto, Umeå
J.S. Pate, Nedland
R.W. Pearcy, Davis
C.H. Peterson, Morehead City
S.L. Pimm, Knoxville
L. Pitelka, Frostburg
A. Polle, Göttingen
M. Price, Riverside
J. Rosenheim, Davis
O. Sala, Buenos Aires
J. Sarukhan, Mexico
S. Scheu, Darmstadt
B. Schmid, Zürich
J. Shykoff, Orsay
D. Simberloff, Knoxville
K. Spitze, Coral Gables
M.L. Stanton, Davis
G. Stewart, Brisbane
P. Stiling, Tampa
T. Tscharntke, Göttingen
S. Ulfstrand, Uppsala
M.J. Vanni, Oxford
A. Watkinson, Norwich
W. Wieser, Innsbruck
V. Wolters, Giessen
H. Ziegler, München

Springer

Oecologia

Derived from "*Zeitschrift für Morphologie und Ökologie der Tiere*", *Oecologia* was founded in 1968, volumes (1968–1982), and edited by H. Remmert. As of volume 53 (1982) the journal has been edited by both H. Remmert and E.-D. Schulze. As of volume 81 (1989) the journal has been edited by J.R. Ehleringer, Salt Lake City; C.H. Peterson, Morehead City; H. Remmert, Marburg; E.-D. Schulze, Bayreuth. As of volume 83 (1990) the journal has been edited by J.R. Ehleringer, Salt Lake City; C.H. Peterson, Morehead City; M. Schaefer, Göttingen; E.-D. Schulze, Bayreuth. As of volume 110 (1997) the journal has been edited by J.R. Ehleringer, Salt Lake City; M. Schaefer, Göttingen; E.-D. Schulze, Bayreuth; D.R. Strong, Bodega Bay.

Copyright

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), all translation rights as well as the rights to publish the article in any electronic form. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The Canada Institute for Scientific and Technical Information (CISTI) provides a comprehensive, world-wide document delivery service for all Springer-Verlag journals. For more information. or to place an order for a copyright-cleared Springer-Verlag document, please contact Client Assistant, Document Delivery, Canada Institute for Scientific and Technical Information, Ottawa K1A OS2, Canada (Tel: 613-993-9251; FAX: 613-952-8243; e-mail: cisti.docdel@nrc.-ca).

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0029-8549, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

Printers:

Universitätsdruckerei H. Stürtz AG, Würzburg

© Springer-Verlag Berlin Heidelberg 1998

Springer-Verlag GmbH & Co. KG, Berlin, Germany

Printed in Germany

Springer

Contents

Allainé D, Graziani L, Coulon J: Post-weaning mass gain in juvenile alpine marmots Marmota marmota 370
Allen JA → Goulson D
Allen MF → Rillig MC
Anten NPR, Miyazawa K, Hikosaka K, Nagashima H, Hirose T: Leaf nitrogen distribution in relation to leaf age and photon flux density in dominant and subordinate plants in dense stands of a dicotyledonous herb 314
Atmar W → Wright DH
Austin AT, Vitousek PM: Nutrient dynamics on a precipitation gradient in Hawai'i 519

Bariac T → Le Roux X
Bazzaz FA → Berntson GM
Beadle CL → Warren CR
Beck E → Fetene M
Belk MC: Predator-induced delayed maturity in bluegill sunfish (*Lepomis macrochirus*): variation among populations 203
Bennett NC → Jarvis JUM
Berntson GM, Bazzaz FA: Regenerating temperate forest mesocosms in elevated CO_2: belowground growth and nitrogen cycling 115
Binkley D → Garcia-Montiel DC
Bliss SA, Zedler PH: The germination process in vernal pools: sensitivity to environmental conditions and effects on community structure 67
Blossey B → Nötzold R
Bostock RM → Stout MJ
Bowdish TI, Stiling P: The influence of salt and nitrogen on herbivore abundance: direct and indirect effects 400
Brandl R → Frenzel M
Burdon JJ → Espiau C

Caldwell MM, Dawson TE, Richards JH: Hydraulic lift: consequences of water efflux from the roots of plants 151
Cerdá X, Retana J: Interference interactions and nest usurpation between two subordinate ant species 577
Chaboudez P → Espiau C
Chiariello NR → Rillig MC
Clarke KR, Warwick RM: Quantifying structural redundancy in ecological communities 278
Coburn DK, Geiser F: Seasonal changes in energetics and torpor patterns in the subtropical blossom-bat *Syconycteris australis* (Magachiroptera) 467
Cook RR, Quinn JF: An evaluation of randomization models for nested species subsets analysis 584
Cooper SM, Ginnett TF: Spines protect plants against browsing by small climbing mammals 219
Cordell S, Goldstein G, Mueller-Dombois D, Webb D, Vitousek PM: Physiological and morphological variation in *Metrosideros polymorpha*, a dominant Hawaiian tree species, along an altitudinal gradient: the role of phenotypic plasticity 188
Coulon J → Allainé D
Cresswell JE: Morphological correlates of necromass accumulation in the traps of an Eastern tropical pitcher plant, *Nepenthes ampullaria* Jack, and observations on the pitcher infauna and its reconstitution following experimental removal 383
Cummings DL → Kauffman JB
Curtis PS → Lussenhop J
Curtis PS, Wang X: A meta-analysis of elevated CO_2 effects on woody plant mass, form, and physiology 299
Cutler A → Wright DH

D'Antonio CM → Ley RE
Daclinat B → Espiau C
Dautel H, Knülle W: The influence of physiological age of *Argas reflexus* larvae (Acari: Argasidae) and of temperature and photoperiod on induction and duration of diapause 46
Davidson NJ → Warren CR
Dawson TE → Caldwell MM
Denys C, Schmidt H: Insect communities on experimental mugwort (*Artemisia vulgaris* L.) plots along an urban gradient 269
Dianmo L → Yiming L
Dixon AFG → Doumbia M
Doumbia M, Hemptinne J-L, Dixon AFG: Assessment of patch quality by ladybirds: role of larval tracks 197
Duffey SS → Stout MJ

Ehleringer JR → Sandquist DR
Erhardt A → Rusterholz HP
Espiau C, Riviere D, Burdon JJ, Gartner S, Daclinat B, Hasan S, Chaboudez P: Host-pathogen diversity in a wild system: *Chondrilla juncea-Puccinia chondrillina* 133

Fetene M, Gashaw M, Nauke P, Beck E: Microclimate and ecophysiological significance of the tree-like life-form of *Lobelia rhynchopetalum* in a tropical alpine environment 332
Field CB → Rillig MC
Forsyth DM, Hickling GJ: Increasing Himalayan tahr and decreasing chamois densities in the eastern Southern Alps, New Zealand: evidence for interspecific competition 377
Fraser LH, Grime JP: Top-down control and its effect on the biomass and composition of three grasses at high and low soil fertility in outdoor microcosms 239
Frenzel M, Brandl R: Diversity and composition of phytophagous insect guilds on Brassicaceae 391

Garcia-Montiel DC, Binkley D: Effect of *Eucalyptus saligna* and *Albizia falcataria* on soil processes and nitrogen supply in Hawaii 547
Gartner S → Espiau C
Gashaw M → Fetene M
Gebauer RLE, Strain BR, Reynolds JF: The effect of elevated CO_2 and N availability on tissue concentrations and whole plant pools of carbon-based secondary compounds in loblolly pine (*Pinus taeda*) 29
Geiser F → Coburn DK
Geiser F → Körtner G
Ginnett TF → Cooper SM
Goldstein G → Cordell S
Goulson D, Stout JC, Hawson SA, Allen JA: Floral display size in comfrey, *Symphytum officinale* L. (Beraginaceae): relationships with visitation by three bumblebee species and subsequent seed set 502
Graziani L → Allainé D
Green TGA → Kappen L
Griffiths H → Smith EC
Grime JP → Fraser LH

Hättenschwiler S, Körner C: Biomass allocation and canopy development in spruce model ecosystems under elevated CO_2 and increased N deposition 104
Hartley SE: The chemical composition of plant galls: are levels of nutrients and secondary compounds controlled by the gall-former? 492
Hasan S → Espiau C
Hawson SA → Goulson D
Hay ME → Miller MW
Hemptinne J-L → Doumbia M
Hendrey GR → Lüscher A
Hickling GJ → Forsyth DM
Hikosaka K → Anten NPR
Hirose T → Anten NPR
Hovenden MJ → Warren CR
Howard DM → Latter PM
Howson G → Latter PM
Huante P, Rincón E: Responses to light changes in tropical deciduous woody seedlings with contrasting growth rates 53
Hurd LE → Moran MD

Iwaniec UT → Schoeninger MJ

Jackson RB, Sala OE, Paruelo JM, Mooney HA: Ecosystem water fluxes for two grasslands in elevated CO_2: a modeling analysis 537
Jarvis JUM, Bennett NC, Spinks AC: Food availability and foraging by wild colonies of Damaraland mole-rats (*Cryptomys damarensis*): implications for sociality 290

Körner C → Hättenschwiler S
Körtner G, Geiser F: Ecology of natural hibernation in the marsupial mountain pygmy-possum (*Burramys parvus*) 170
Kappen L, Schroeter B, Green TGA, Seppelt RD: Chlorophyll *a* fluorescence and CO_2 exchange of *Umbilicaria aprina*

under extreme light stress in the cold 325
Karhu KJ, Neuvonen S: Wood ants and a geometrid defoliator of birch: predation outweighs beneficial effects through the host plant 509
Kauffman JB, Cummings DL, Ward DE: Fire in the Brazilian Amazon. 2. Biomass, nutrient pools and losses in cattle pastures 415
Klironomos JN → Rillig MC
Knülle W → Dautel H

Lüscher A, Hendrey GR, Nösberger J: Long-term responsiveness to free air CO_2 enrichment of functional types, species and genotypes of plants from fertile permanent grassland 37
Latter PM, Howson G, Howard DM, Scott WA: Long-term study of litter decomposition on a Pennine peat bog: which regression? 94
Le Roux X, Bariac T: Seasonal variations in soil, grass and shrub water status in a West African humid savanna 456
Lewellen RH, Vessey SH: Modeling biotic and abiotic influences on population size in small mammals 210
Ley RE, D'Antonio CM: Exotic grass invasion alters potential rates of N fixation in Hawaiian woodlands 179
Lipson DA, Monson RK: Plant-microbe competition for soil amino acids in the alpine tundra: effects of freeze-thaw and dry-rewet events 406
Longland WS → Vander Wall SB
Lussenhop J, Treonis A, Curtis PS, Teeri JA, Vogel CS: Response of soil biota to elevated atmospheric CO_2 in poplar model systems 247

McCarty JP → Turner AM
McIntosh AR → Peckarsky BL
Mikkelson GM → Wright DH
Miller MW, Hay ME: Effects of fish predation and seaweed competition on the survival and growth of corals 231
Miyazawa K → Anten NPR
Monson RK → Lipson DA
Mooney HA → Jackson RB
Moorhead DL, Westerfield MM, Zak JC: Plants retard litter decay in a nutrient-limited soil: a case of exploitative competition? 530
Moran MD, Hurd LE: A trophic cascade in a diverse arthropod community caused by a generalist arthropod predator 126
Mueller-Dombois D → Cordell S
Mysterud A: The relative roles of body size and feeding type on activity time of temperate ruminants 442

Nösberger J → Lüscher A
Nötzold R, Blossey B, Newton E: The influence of below ground herbivory and plant competition on growth and biomass allocation of purple loosestrife 82
Nagashima H → Anten NPR
Nash LT → Schoeninger MJ
Nauke P → Fetene M
Neuvonen S → Karhu KJ
Newton E → Nötzold R
Niemelä J → Yiming L

Paruelo JM → Jackson RB
Patterson BD → Wright DH
Peckarsky BL, McIntosh AR: Fitness and community consequences of avoiding multiple predators 565
Pyare S → Vander Wall SB

Quinn JF → Cook RR

Retana J → Cerdá X
Reusch TBH, Williams SL: Variable responses of native eelgrass *Zostera marina* to a non-indigenous bivalve *Musculista senhousia* 428
Reynolds JF → Gebauer RLE
Richards JH → Caldwell MM
Rillig MC, Allen MF, Klironomos JN, Chiariello NR, Field CB: Plant species-specific changes in root-inhabiting fungl in a california annual grassland: responses to elevated CO_2 and nutrients 252
Rincón E → Huante P
Riviere D → Espiau C
Rusterholz HP, Erhardt A: Effects of elevated CO_2 on flowering phenology and nectar production of nectar plants important for butterflies of calcareous grasslands 341

Sala OE → Jackson RB
Sandquist DR, Ehleringer JR: Intraspecific variation of drought adaptation in brittlebush: leaf pubescence and timing of leaf loss vary with rainfall 162
Schlosser IJ: Fish recruitment, dispersal, and trophic interactions in a heterogeneous lotic environment 260
Schmidt H → Denys C
Schoeninger MJ, Iwaniec UT, Nash LT: Ecological attributes recorded in stable isotope ratios of arboreal prosimian hair 222
Schonewald C → Smallwood KS
Schroeter B → Kappen L
Schwinning S, Weiner J: Mechanisms determining the degree of size asymmetry in competition among plants 447
Scott WA → Latter PM
Seppelt RD → Kappen L
Smallwood KS, Schonewald C: Study design and interpretation of mammalian carnivore density estimates 474
Smith EC, Griffiths H: Intraspecific variation in photosynthetic responses of trebouxioid lichens with reference to the activity of a carbon-concentrating mechanism 360
Spinks AC → Jarvis JUM
Stiling P → Bowdish TI
Stout JC → Goulson D
Stout MJ, Workman KV, Bostock RM, Duffey SS: Specificity of induced resistance in the tomato, *Lycopersicon esculentum* 74
Strain BR → Gebauer RLE

Teeri JA → Lussenhop J
Treonis A → Lussenhop J
Turner AM, McCarty JP: Resource availability, breeding site selection, and reproductive success of red-winged blackbirds 140

Vander Wall SB, Longland WS, Pyare S, Veech JA: Cheek pouch capacities and loading rates of heteromyid rodents 21
Veech JA → Vander Wall SB
Vessey SH → Lewellen RH
Vitousek PM → Austin AT
Vitousek PM → Cordell S
Vogel CS → Lussenhop J

Wang X → Curtis PS
Ward DE → Kauffman JB
Warren CR, Hovenden MJ, Davidson NJ, Beadle CL: Cold hardening reduces photoinhibition of *Eucalyptus nitens* and *E. pauciflora* at frost temperatures 350
Warwick RM → Clarke KR
Webb D → Cordell S
Weiner J → Schwinning S
Westerfield MM → Moorhead DL
White TCR: Green islands still not explained 517
Williams SL → Reusch TBH
Workman KV → Stout MJ
Wright DH, Patterson BD, Mikkelson GM, Cutler A, Atmar W: A comparative analysis of nested subset patterns of species composition 1

Yiming L, Niemelä J, Dianmo L: Nested distribution of amphibians in the Zhoushan archipelago, China: can selective extinction cause nested subsets of species? 557

Zak JC → Moorhead DL
Zedler PH → Bliss SA

Indexed in *Current Contents*